



ARCHER Stand Alone Software

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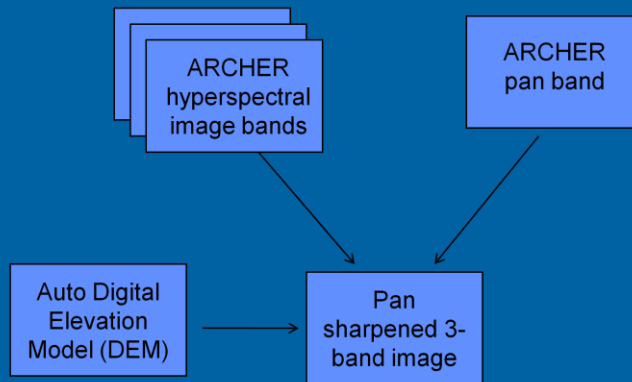
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U.S. Geological Survey

This is a set of slides to demonstrate two of the ARCHER software packages available from Space Computer Corp.

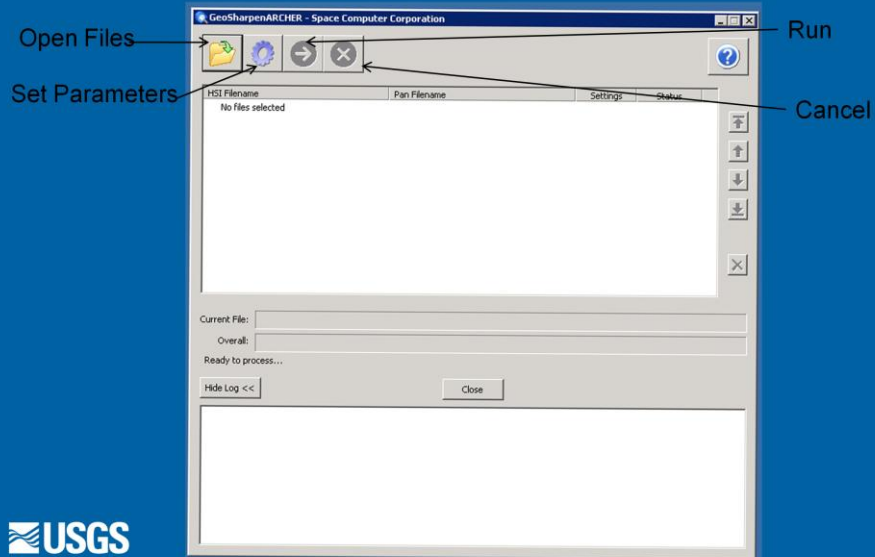
GeoSharpen



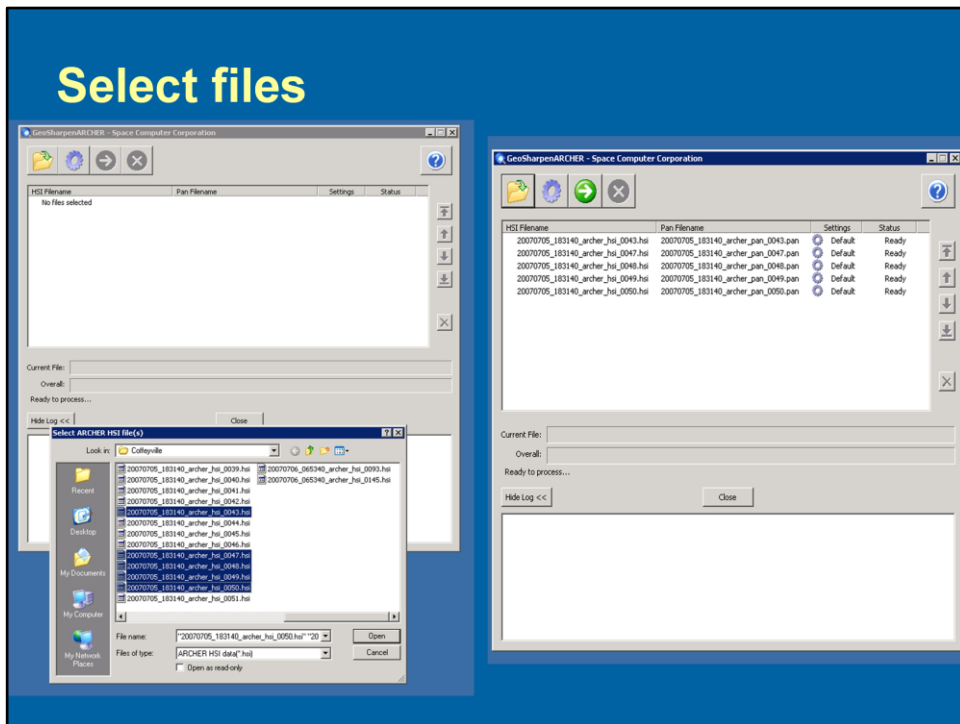
GeoSharpen allows the user to select 3 bands to combine with the pan image file to make a pan sharpened image at a selected resolution.

If this software was available on the ARCHER ground stations, imagery from an ARCHER flight could be output for emergency responders in a relatively short time. It takes approximately 3 minutes to generate the pan sharpened file.

GeoSharpen



This is a screen shot of the initial processing window of GeoSharpen. The window interface is easy to use and the same for both the GeoSharpen and GeoReg products.



The user is able to select all the files or just selected files to process. This is useful for emergency response if the user knows which files are critical to process first. The ARCHER operators can note which file numbers might contain important items of interest for responders.

The software displays the HSI files for selection, the program automatically looks to make sure the corresponding pan bands are in the directory.

The window on the right shows the selected files, noting the settings (parameters) are in the default setting and are ready to process.

Process one mission at a time as the sensor models will vary.

Naming convention:

20070705_183140_archer_hsi_0043.hsi

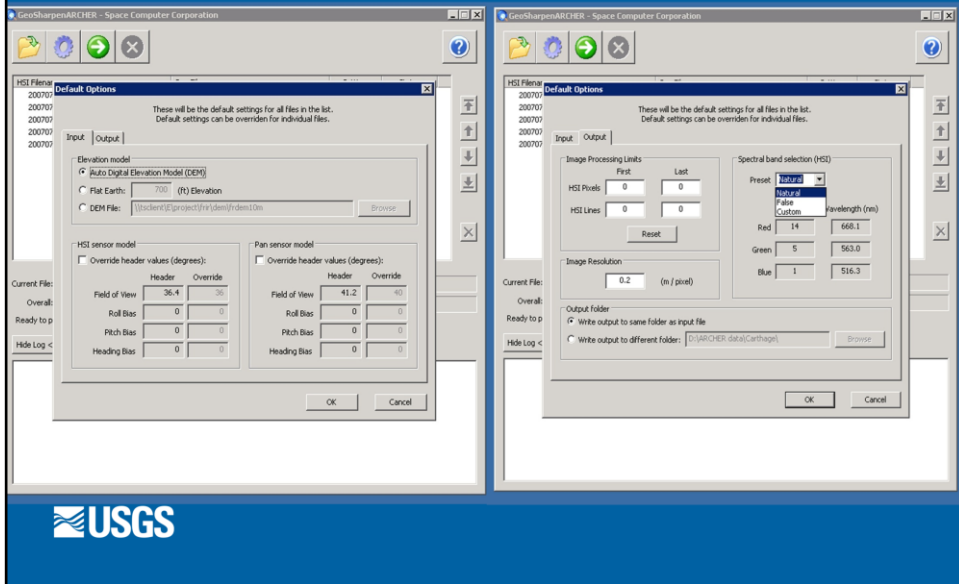
Date 20070705

Mission # 183140

Image type HSI or pan (HSI = hyperspectral imagery, pan = panchromatic imagery)

File #00##, starts with 0000

Set Parameters



Input Parameters

On left is the input parameter screen. It defaults to the Auto DEM (20 gb file is loaded when software is installed) and automatically reads the HSI and Pan sensor model info.

The user would usually just default on the input parameters.

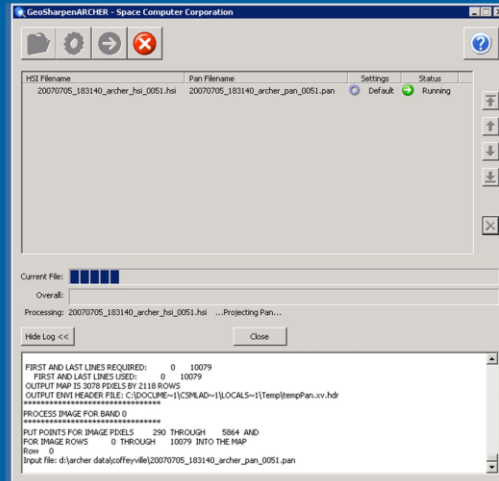
Output Parameters

On the right is the output parameter screen. Default on the *Image Processing Limits*. Under the *Spectral band selection (HSI)* The user can select the preset natural color or false color options or select the desired bands with the custom selection. The user can also select the *Image Resolution* – 0.2 m is the default. The smaller the resolution the larger the file size.

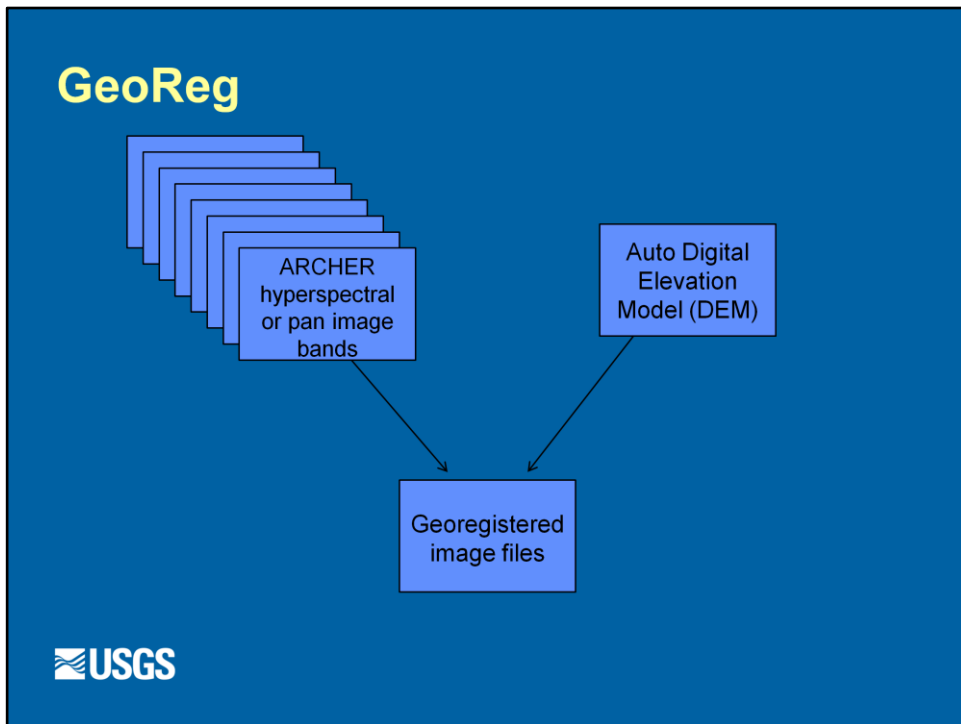
The user then selects the output folder it will write the pan sharpened files to – either the same folder as the input or a different folder. The output folder could be to another external drive or DVD or jump drive, again, to get the data out to responders as quickly as possible.

Run

Example of the
program running

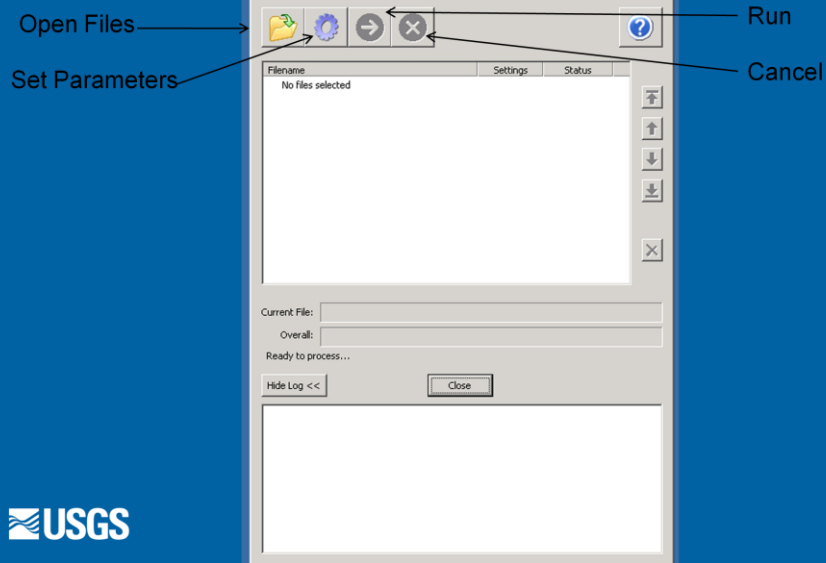


An average file processed in 3 minutes at the 0.20 m spatial resolution. All the files were residing on the same computer as the software. I have run the software with the files on a different computer, with the software accessing the files over a network. These files each processed in about 7 to 8 minutes.



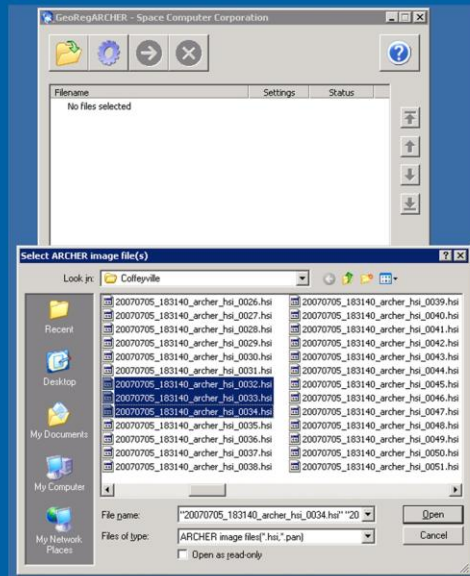
GeoReg allows the user to georectify all the ARCHER image files – both hyperspectral and pan. The user can also use the Auto DEM files, a single elevation, or the user's own DEM files (in the correct format). The hyperspectral bands are processed separately from the pan bands due to the different sensor models of the instruments.

GeoReg



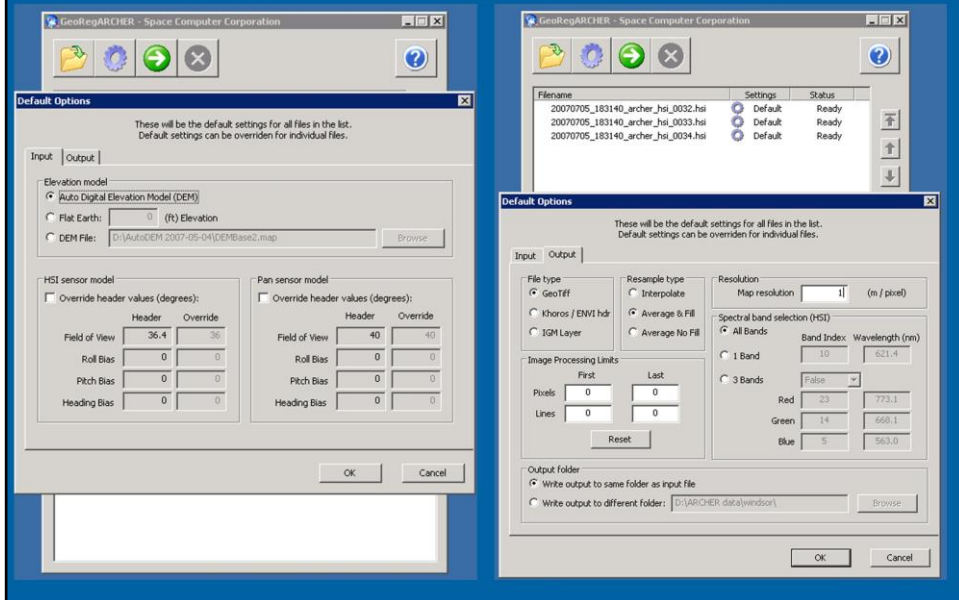
This is a screen shot of the initial processing window for GeoReg. The GeoReg program has the same look and feel to it as GeoSharpen.

Select Files



The user can select all the files or just a few.

Set Parameters



Input Parameters

As with the GeoSharp program, the elevation model can be set, defaulting to the supplied DEM files (Auto DEM). The sensor models will be defaulted.

Output Parameters

Again, the user will usually use the default values shown except for the *Resolution*. The nominal spatial resolution is 1 meter for the HSI imagery. From 0.15 to 1 (m/pixel). The user may want to modify the map resolution for file size constraints and what the ultimate use of the imagery. The software may not be able to handle the smaller size resolution. One test I did at 0.15 produced not only an extremely large file but also a file that was pretty worthless (see next slide).

Differences between *Resolution* output

put\hsi

Name	Size	Type	Date Modified
20070705_183140_archer_hsi_0032_all_bands_0.15m_georeg.tif	4,194,306 KB	TIF File	02/10/2009 3:38 PM
20070705_183140_archer_hsi_0032_all_bands_1.00m_georeg.tif	316,681 KB	TIF File	02/11/2009 8:39 AM
20070705_183140_archer_hsi_0033_all_bands_0.15m_georeg.tif	4,194,313 KB	TIF File	02/10/2009 3:58 PM
20070705_183140_archer_hsi_0033_all_bands_1.00m_georeg.tif	263,924 KB	TIF File	02/11/2009 8:41 AM
20070705_183140_archer_hsi_0034_all_bands_0.15m_georeg.tif	4,194,305 KB	TIF File	02/10/2009 4:18 PM
20070705_183140_archer_hsi_0034_all_bands_1.00m_georeg.tif	255,694 KB	TIF File	02/11/2009 8:43 AM

Processing time: 0.15 m ~20 min
1 m ~3 min



1 m resolution



0.15 m resolution

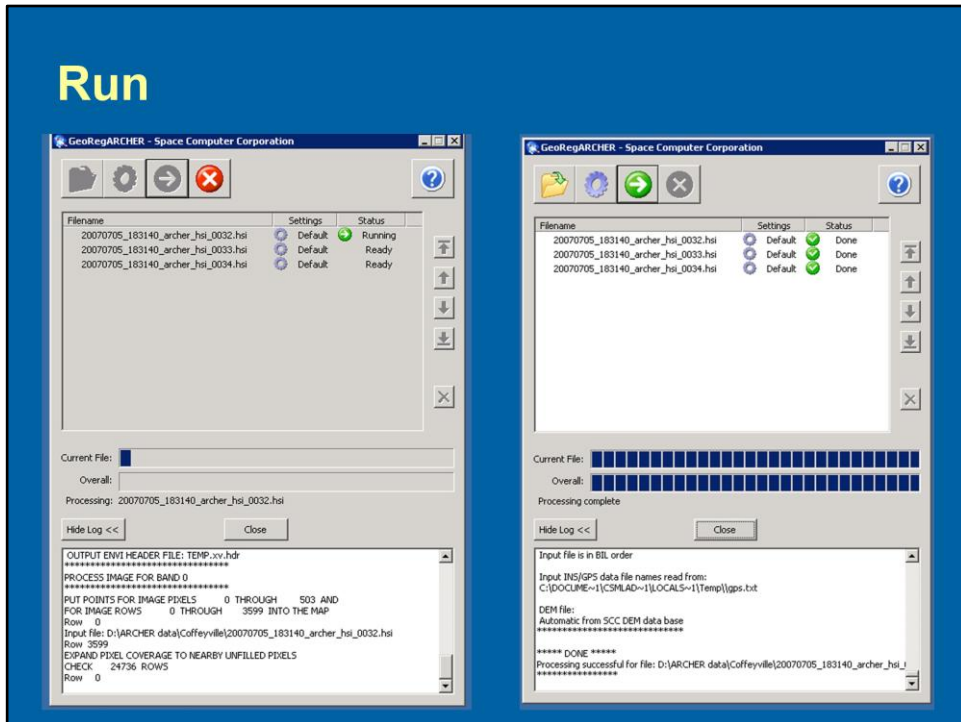


Camera shot - 07/03/2007

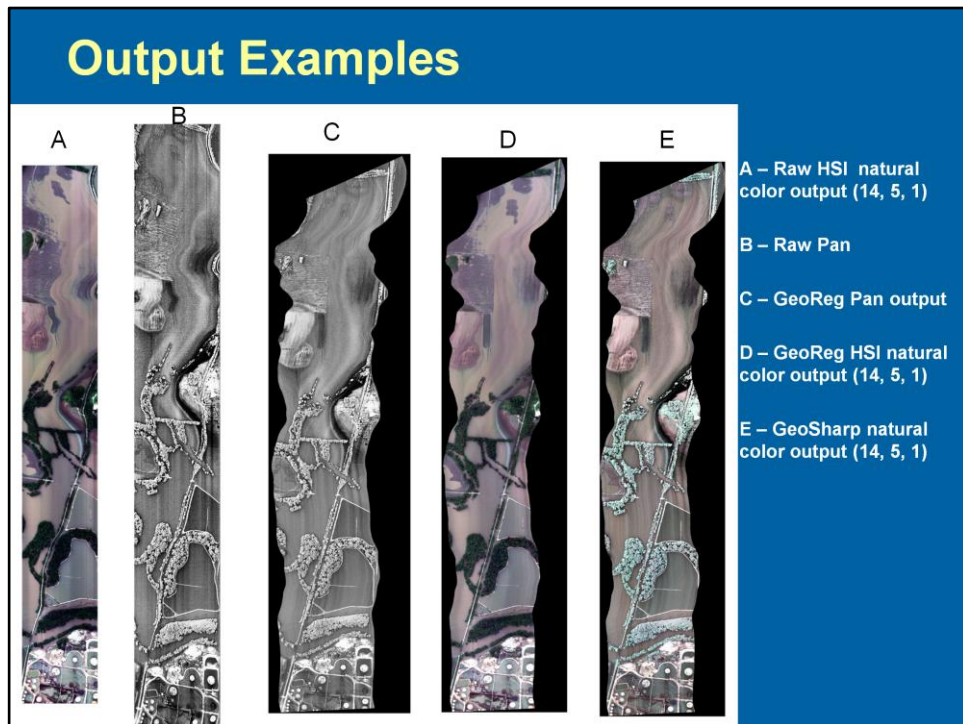


I processed the HSI data (all 52 bands) with GeoReg, once with a 0.15 m spatial resolution and again with a 1 m spatial resolution. I believe the 0.15 might have been too small for the software to handle. Note the difference in file size and length of time to process. The image on the far right was taken on July 3, 2007 (north is to the right).

Run

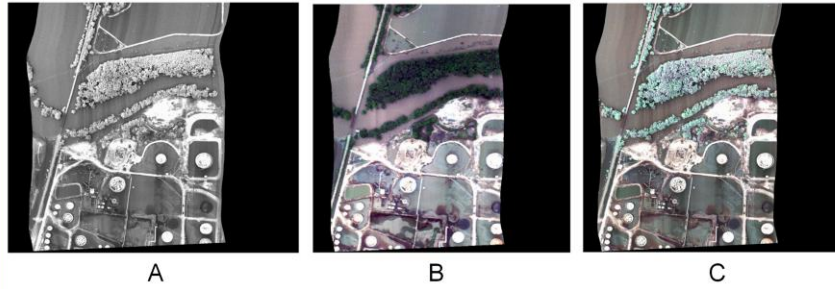


Note the *Status*, when the program is running, it will note which file the program is ready, currently, or done processing. If the user elects to write the output files to the same directory as the input files, files that are complete can be written out to a thumb drive if needed before the processing is complete.



These images show one file (1 minute of flying time). A and B are the raw images. C, D, and E are the rectified files processed with either GeoReg or GeoSharpen.

Enlargement of oil refinery



- A – GeoReg Pan output
- B – GeoReg HSI natural color output
- C – GeoSharp natural color output



These 3 images show an enlargement south end of the previous file over a portion of the oil refinery that had a spill.